

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
15 May 2003 (15.05.2003)

PCT

(10) International Publication Number
WO 03/039400 A2

(51) International Patent Classification⁷: **A61F**

(21) International Application Number: **PCT/IB02/04642**

(22) International Filing Date:
6 November 2002 (06.11.2002)

(25) Filing Language: **English**

(26) Publication Language: **English**

(30) Priority Data:
01 14352 6 November 2001 (06.11.2001) **FR**

(71) Applicant (for all designated States except US): **LDR MEDICAL** [FR/FR]; 4, rue Marie Curie, F-10430 Rosières Pres Troyes (FR).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **HUPPERT, Jean** [FR/FR]; 16, allée Chataignère, F-45280 l'Etrat (FR). **AMEIL, Marc** [FR/FR]; 35, boulevard Saint Marceaux, F-51100 Reims (FR).

(74) Agent: **DEBAY, Yves**; Cabinet Debay, 126 Elysée 2, F-78170 La Celle Saint Cloud (FR).

(81) Designated States (national): AE, AG, AI, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.

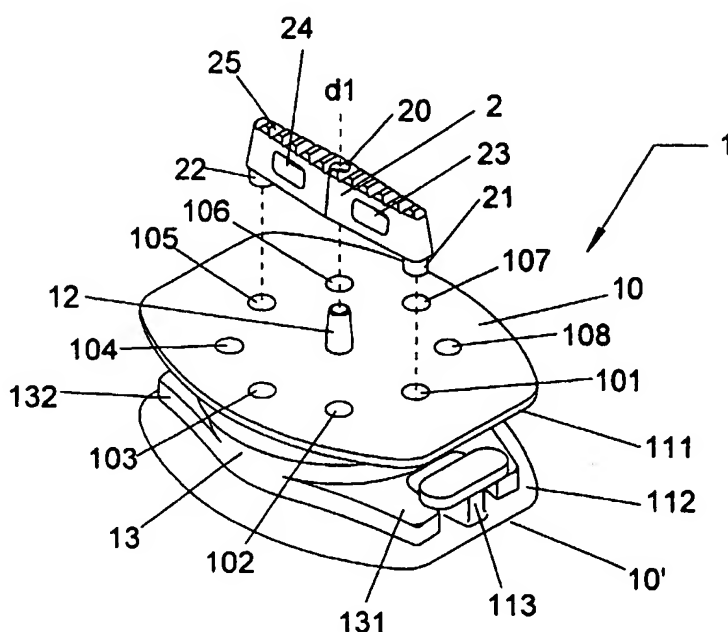
(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— without international search report and to be republished upon receipt of that report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: **OSSEOUS ANCHORING DEVICE FOR A PROSTHESIS**



(57) Abstract: The present invention relates to an osseous anchoring device intended to maintain a prosthesis or an implant in position, and in particular an intervertebral prosthesis. The invention thus proposes an anchoring device for a prosthesis (1), or an implant, intended to be anchored in an osseous surface (310, 320) by impacting or insertion in a housing (311, 321) prepared in this osseous surface, characterised in that it comprises at least one protruding element extending beyond this prosthesis, this protruding element being able to be positioned relative to the prosthesis in a plurality of positions thus making it possible to choose a position adapted to the case to be treated or to the chosen setting mode.

WO 03/039400 A2

OSSEOUS ANCHORING DEVICE FOR A PROSTHESIS

The present invention relates to an osseous anchoring device intended to maintain a prosthesis or implant in position, and in particular an intervertebral prosthesis.

When an internal prosthesis bears on an osseous body or is
5 inserted between several osseous bodies, the position of this prosthesis is often maintained in place by reliefs or irregularities of protruding form on one face of this prosthesis and acting as anchor in the surface of this osseous body.

In the case of intervertebral prostheses, in particular functionally
10 replacing an intervertebral disc, this maintenance can be ensured in several ways. One possibility consists of providing pins extending beyond the surface of the prosthesis, these pins being encrusted, or impacted, in the surface of the vertebral disc, under the effect of the pressure exerted by the vertebrae surrounding the prosthesis.

15 The length of these impacting pins is nonetheless limited by the fact that the two vertebrae must be sufficiently separated to enable insertion of the prostheses and pins in the space thus obtained.

For obtaining greater anchoring depth, it is known from patent
FR 2 659 226 how to use a prosthesis with one or several projections fixed
20 in winged form, extending beyond the plates in contact with the vertebrae and oriented along a plane parallel to the sagittal plane of the rachis. The surgeon then begins by boring a trench in the surface of the vertebral disc opening into one of the sides of the body of the vertebra. This trench is made using a bone chisel or osteotome, and opens towards the outside in
25 a direction corresponding to the direction in which the prosthesis and its winglet will be inserted.

Because of the position of the winglets parallel to the sagittal plane, and given that the prosthesis does not have a rotary shape and must be oriented in a precise angular position around the rachis axis, the

prosthesis must therefore be inserted according to a path allowing median access during the intervention, therefore usually an anterior path.

The aim of the present invention is thus to overcome the disadvantages of prior art by proposing an osseous anchoring device making it possible to set a same prosthesis from different accesses, for
5 example lateral access, antero-lateral access or postero-lateral access.

This aim is achieved with an anchoring device for a prosthesis, or an implant, intended to be anchored in an osseous surface by impacting or by insertion in a housing prepared in this osseous surface, characterised
10 in that it comprises at least one protruding element extending beyond this prosthesis, this protruding element being able to be positioned relative to the prosthesis in a plurality of positions thus making it possible to choose a position adapted to the case to be treated or the setting method chosen.

According to one feature, the protruding element is a winglet carried
15 by a closely plane bearing face of the prosthesis, this winglet having an elongated shape following a plane non-parallel to this bearing face.

According to a further feature, the prosthesis is an inter-vertebral prosthesis intended to be anchored in the vertebral plate of at least one vertebra, the winglet being able to be positioned in a plurality of angular
20 positions around an axis closely perpendicular to the bearing face of the prosthesis or to the vertebral plate, the plurality of angular positions being defined by a plurality of co-operating means prepared in the bearing face of the prosthesis and co-operating with the complementary means on the winglet.

According to a further feature, the winglet is maintained in an angular position determined by at least one shape irregularity carried by the winglet and co-operating with the complementary shape on the prosthesis, or by a shape irregularity carried by the bearing face of the prosthesis and co-operating with the complementary shape on the winglet,
25 or by shape irregularities carried by the winglet and by the bearing face and co-operating with each other.
30

According to a further feature, the winglet has a drilling set along the plane of the winglet, fitted around a pin integral with the bearing face of the prosthesis, at least one of the two extremities of the winglet having a protruding part for fitting into a housing prepared in the bearing face of the prosthesis and thus maintaining the angular position of the winglet.

According to a further feature, the drilling is located in the central part or at one extremity of the winglet, this drilling and the pin being truncated in shape, with complementary tapering relative to each other, with angles sufficiently small to produce a certain maintenance in position of the winglet on the pin.

According to a further feature, the winglet has at least one recess in its thickness, enabling the two faces of the winglet to communicate.

According to a further feature, the winglet has shape irregularities on the surface of at least one of its faces, able to limit the risks of the winglet sliding in contact with the osseous matter.

According to a further feature, the shape irregularities are indentations formed on the crest of the winglet or on its lateral faces.

According to a further feature, the co-operating means are holes prepared on the bearing face of the prosthesis and the complementary means of the winglet are lugs extending beyond its face in contact with the prosthesis.

According to a further feature, the co-operating means are lugs extending beyond the bearing face of the prosthesis and the complementary means of the winglet are holes prepared in its face in contact with the prosthesis.

The invention, together with its characteristics and advantages, will become clearer by reading the description below, in reference to the attached drawings in which:

- figure 1 shows a view in perspective, before positioning the winglet, of a disc prosthesis comprising an anchoring device according to

an embodiment of the invention with a symmetrical winglet with recesses and allowing four angular positions;

- figures 2a and 2b show a view in perspective of a disc prosthesis comprising an anchoring device according to an embodiment of the invention with a symmetrical winglet with recesses and allowing two
5 angular positions, the winglet being positioned for setting by lateral access or by median access respectively;

- figure 3 shows a lateral cross section of a prosthesis in position between two vertebrae after setting by lateral access, this prosthesis
10 comprising two anchoring devices according to the invention, one of them in an embodiment wherein the winglet does not have any recesses;

- figure 4 shows a transversal cross section of a vertebra in which a prosthesis is anchored comprising an anchoring device according to the invention, after setting by postero-lateral access, in an embodiment with a
15 symmetrical winglet without recesses and allowing four angular positions.

The present description refers to an anchoring device according to the invention applied to an inter-vertebral disc prosthesis of a functional type, meaning that it allows relative movement of the two vertebrae.

Although the invention is described here for the case of such a prosthesis, it must be evident that the anchoring device according to the invention can also be applied to other types of devices, for example non-functional such as, for example, an arthrodesic thoracic cage or a tumorous cage. In the present description, the term "prosthesis" must therefore be understood as being able to be applied equally well to a
20 prosthesis as to an implant.

The anchoring device according to the invention can also be used for maintaining other types of prostheses, used for other reasons and in other regions of the body, when they comprise a part bearing against an osseous surface. The device according to the invention can also be
30 combined with other anchoring devices, such as osseous anchoring pins or screws.

In the case (not shown) of an implant constituted of a tumorous cage, the device to be anchored, hereinafter called "the prosthesis" comprises a fixed structure intended to replace a vertebra or a part of a vertebra, when the body of this one has deteriorated, in particular after
5 ablation of a tumour.

In an embodiment shown in figure 1, a functional prosthesis 1 for an intervertebral disc receives an anchoring device according to the invention.

The prosthesis comprises two plates 111, 112, surrounding a
10 nucleus 13 with two curved sides, with curvatures of different radii but oriented in the same direction. The plates bear in a complementary way on the two sides of the nucleus, the difference in curvature allowing lateral displacement of the nucleus when the two plates are inclined relative to each other. Around its periphery, the plate has two pairs 131, 132 of arms,
15 each surrounding a pillar 101, 102 integral with one of the plates. This pillar has an upper part wider than the opening of the arms of the nucleus, and co-operates with the latter to limit lateral and vertical movement of the nucleus, thus preventing lifting of the nucleus when the plates are inclined.

Each of the plates 111, 112 has an external face 10, 10'
20 respectively, called a bearing face, with a closely plane surface. Once in place between two contiguous vertebrae 31, 32 as shown in figure 3, each plate of the prosthesis bears against the part of each of the vertebrae opposite the other vertebra, that is to say against the vertebral plate 310, 320.

25 On the disc receiving the anchoring device according to the invention, the external surface of the plate has at least one pin 12, preferably central, elongated along a direction perpendicular to this surface. A winglet 2, with elongated shape according to a plane non-parallel to the surface of the bearing face 10, and for example
30 perpendicular to this surface, is fitted around this pin. This winglet comprises a drilling 20 on one of its edges, this drilling surrounding the pin

12 and co-operating with the latter to prevent any movement of the winglet 2 in translation in a plane parallel to the bearing surface 10. Advantageously, the drilling 20 of the winglet and the pin 12 that it receives have closely complementary truncated shapes. These shapes
5 thus have a sufficiently low angle taper so that their interlock allows to maintain the winglet on the pin, in particular during the phases of manipulation and setting of the prosthesis. Preferably, the bearing face comprises a pin 12 in its central region, and the drilling 20 of the winglet is located in its central part. It is thus possible to position said winglet on the
10 pin in a plurality of angular positions on the bearing face and around said pin. The prosthesis furthermore comprises a plurality of co-operating means able to define the angular position by co-operating with the complementary means carried by the winglet.

In another embodiment (not shown), the winglet drilling 20 is
15 situated close to one of its extremities or in any position on the edge of the winglet.

The co-operating means are, for example, housings prepared in the bearing face 10 of the prosthesis. The complementary means of the winglet 2 are then one or several protruding parts carried by the winglet on
20 one of its extremities or on the two, on the face opposite the bearing face 10 of the prosthesis.

In the embodiment shown here these housings are holes 101 to 108 prepared on the bearing face of the prosthesis, and these protruding parts are lugs 21, 22 carried by the two extremities of the winglet. In
25 certain determined angular positions of the winglet fitted on the bearing face pin, these lugs 21, 22 are inserted into the holes prepared in this same bearing face. These holes 101, 105 then co-operate with the lugs of the winglet to maintain the angular position of the winglet around the pin 12, for example when inserting the prosthesis.

30 In an embodiment variant (not shown), the co-operating means are protruding parts, for example lugs, carried by the bearing face of the

prosthesis. The complementary means are then housings, for example holes, prepared in the winglet face in contact with the prosthesis. In this variant, it should be noted that the lugs carried by the prosthesis and not used by the winglet also combine to maintain the prosthesis in position, by
5 impacting in the vertebral disc under the effect of the pressure of the vertebrae.

In an embodiment shown in figure 1, the upper plate 111 of the prosthesis 1 comprises on its bearing face 10 a group of eight holes distributed around a same circle around the pin 12 and following angular
10 intervals of 45°. By inserting the lugs of the winglet 2 into any couple of two diametrically opposite holes, it is thus possible to position this winglet in any one of the angular positions defined by these hole couples. In an embodiment shown in figure 1, the eight holes allow four different angular positions if the winglet is symmetrical around the pin, meaning 0°, 45°, 90°
15 and 135°, or eight positions if the winglet is not symmetrical. If one of these hole couples corresponds to the sagittal plane, these four positions (2a, 2b, 2c, 2d, in figure 4) of the winglet make it possible to use the same winglet with the same prosthesis for insertion by median access, antero-lateral access, lateral access or postero-lateral access.

20 In the embodiment shown in figures 2a and 2b, the anchoring device according to the invention comprises four holes 101, 103, 105, 107, and makes it possible to set the winglet in two angular positions. Figure 2a thus shows the winglet mounted for setting by median access, and figure 2b shows the winglet mounted for setting by lateral access.

25 It is evidently understood that the invention also makes it possible to supply a one and only prosthesis with its anchoring device for several different setting methods, which thus reduces the number of versions to be manufactured or kept in stock.

Before inserting the prosthesis, a housing 311, 321, in trench form
30 is hollowed out in the surface of each of the vertebral plates 310, 320 respectively. This housing is, for example, made in such a way that it only

opens onto a single side 311, figure 4, and is oriented along the same side as the setting provided for the prosthesis.

When setting, the winglet can thus slide into this trench from the vertebral plate side to enable the prosthesis to arrive in its definitive position without having to separate the vertebrae too much.

According to the applications, the winglet can have one or several recesses 23, 24, making the two opposite faces communicate. These recesses can, for example, be refilled by osseous matter reconstituted from the two sides of the trench 311. This refilling thus allows maintenance in position of the winglet to be consolidated in the vertebral plate.

The winglet 2 can also have shape irregularities on one or several of its sides, for example notches or indentations 25, which make it possible to limit the risks of sliding in the trench 311 by attaching to the walls of said trench. On one or several of its sides, the winglet 2 can also comprise an anti-slip surface obtained, for example, by direct moulding, by surface marking, or by coating. In particular, such a surface state can be produced in hot textured titanium.

It must be evident to those skilled in the art that the present invention allows embodiments under many other specific forms without extending beyond the field of application of the invention as claimed. Consequently, the present embodiments must be considered as illustration only, but can be modified in the domain defined by the range of the attached claims, and the invention must not be limited solely to the details given hereabove.

CLAIMS

1. Anchoring device for a prosthesis (1) or an implant, intended to be anchored in an osseous surface (310, 320) by impacting or insertion in a housing (311, 321) prepared in this osseous surface, characterised in that it comprises at least one protruding element extending beyond this
5 prosthesis, this protruding element being able to be positioned relative to the prosthesis in a plurality of positions thus making it possible to choose a position adapted to the case to be treated or to the chosen setting method.

2. Anchoring device according to claim 1, characterised in that the protruding element is a flattened winglet (2) carried by a closely plane
10 bearing face (10) of the prosthesis, this winglet having an elongated shape following a plane non-parallel to this bearing face.

3. Anchoring device according to one of the previous claims, characterised in that the prosthesis (1) is an intervertebral prosthesis intended to be anchored in the vertebral plate (310, 320) of at least one
15 vertebra (31, 32), the winglet (2) being able to be positioned in a plurality of angular positions (2a, 2b, 2c) around an axis (d1) closely perpendicular to the bearing face (10) of the prosthesis or to the vertebral plate, the plurality of angular positions being defined by a plurality of co-operating means prepared in the bearing face of the prosthesis and co-operating
20 with complementary means on the winglet.

4. Anchoring device according to one of the claims 2 or 3, characterised in that the winglet (2) is maintained in an angular position determined by at least one shape irregularity carried by the winglet and co-operating with the complementary shape on the prosthesis, or by a
25 shape irregularity carried by the bearing face of the prostheses and co-operating with the complementary shape on the winglet, or by shape

irregularities carried by the winglet and by the bearing face and co-operating with each other.

5 5. Anchoring device according to one of the claims 2 to 4, characterised in that the winglet (2) has a drilling (20) set along the plane of the winglet, fitted around a pin (12) integral with the bearing face (10) of the prosthesis, at least one of the two extremities of the winglet having a protruding part (21, 22) for fitting into a housing (121, 125) prepared in the bearing face of the prosthesis and thus maintaining the angular position of the winglet.

10 6. Anchoring device according to one of the claims 2 to 4, characterised in that the drilling (20) is located in the central part or at one extremity of the winglet (2), this drilling and the pin (12) being truncated in shape, with complementary tapering relative to each other, with angles sufficiently small to produce a certain maintenance in position of the winglet on the pin.

7. Anchoring device according to one of the claims 2 to 6, characterised in that the winglet (2) has at least one recess (21, 22) in its thickness, enabling the two faces of the winglet to communicate.

20 8. Anchoring device according to one of the claims 2 to 7, characterised in that the winglet (2) has shape irregularities (25) on the surface of at least one of its faces, able to limit the risks of the winglet sliding in contact with the osseous matter.

9. Anchoring device according to claim 8, characterised in that the shape irregularities (25) are indentations formed on the crest of the winglet or on its lateral faces.

10. Anchoring device according to claim 3, characterised in that the co-operating means are holes (101 to 108) prepared on the bearing face

(10) of the prosthesis and the complementary means of the winglet (2) are lugs (21, 22) extending beyond the face in contact with the prosthesis.

11. Anchoring device according to claim 3, characterised in that the co-operating means are lugs extending beyond the bearing face of the
5 prosthesis and the complementary means of the winglet are holes prepared in its face in contact with the prosthesis.

1/2

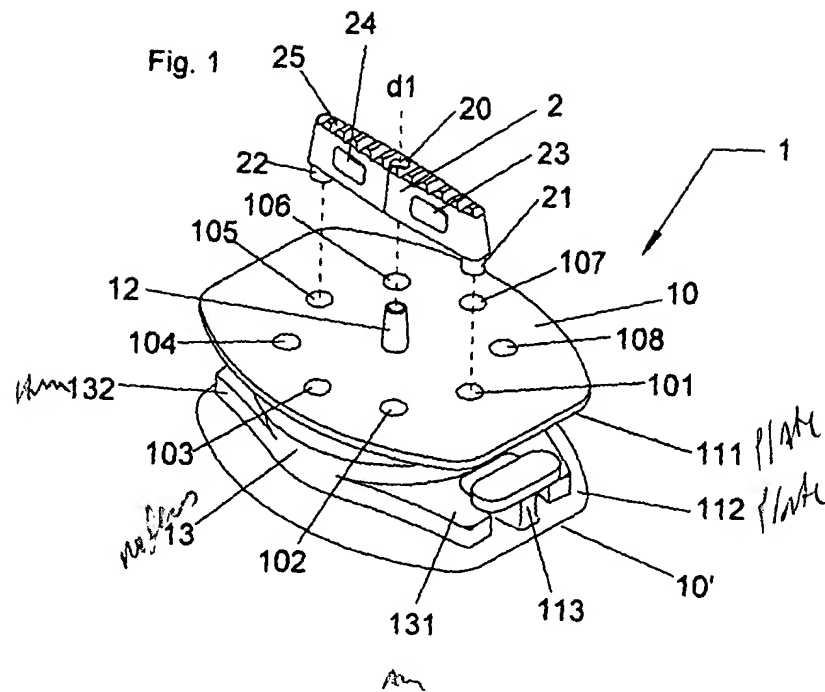
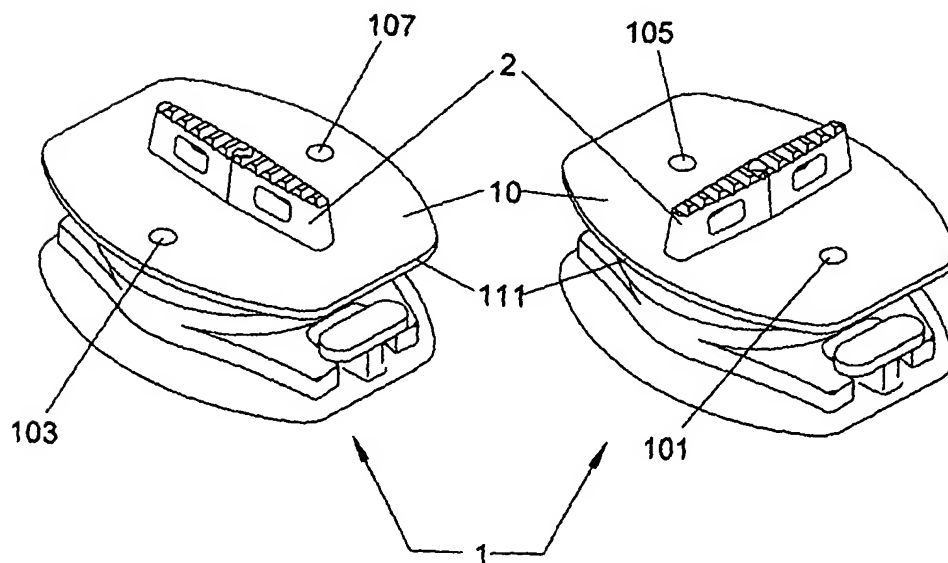


Fig. 2a

Fig. 2b



2/2

Fig. 3

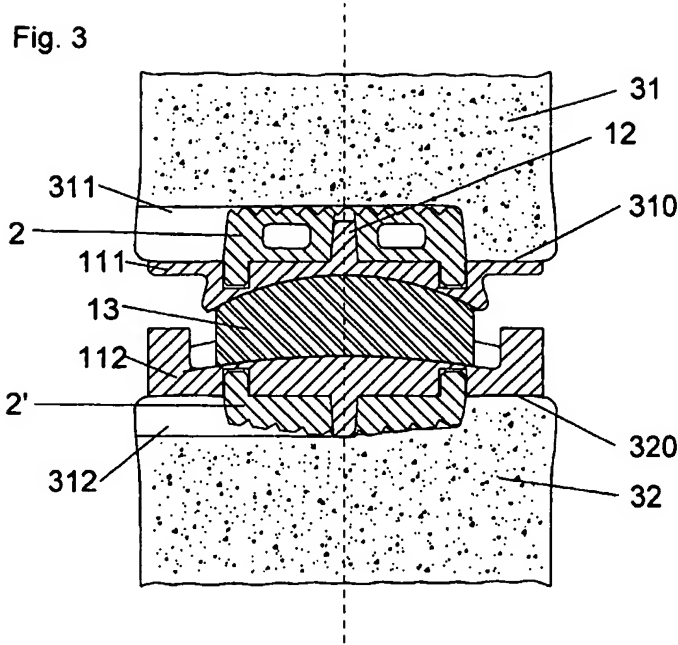


Fig. 4

